



# EZ Torque Operation Manual

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### Revision History

| Rev | Date     | Reason            |
|-----|----------|-------------------|
| B   | 12/30/14 | Re-Issued for Use |
|     |          |                   |

### Description of Change

| Rev | Change                                                       |
|-----|--------------------------------------------------------------|
| B   | Reformatted and added Operation and Troubleshooting sections |
|     |                                                              |

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# GENERAL



Figure 1

Texas International Oilfield Tools (TIOT) offers the EZ Torque which operates manual tongs remotely and it is capable of providing a very high force pull. The hydraulic power unit runs the cylinder. The cylinder operates in conjunction with the cathead.



Large forces are involved in using this device. Operate this equipment with extreme caution



Ensure tongs are capable of safely handling the torque and pull loads applied. Follow normal safety rules working around wirelines under tension

## CONVENTIONS

| IMPORTANT SYMBOL IDENTIFICATION                                                             |                                          |
|---------------------------------------------------------------------------------------------|------------------------------------------|
|          | <b>WARNING</b> to Operators / Users      |
|          | <b>CAUTION</b> to Operators / Users      |
| <br>NOTE | <b>NOTIFICATION</b> to Operators / Users |

Table 1

# SAFETY

Texas International's equipment is used and installed in controlled rig environments involving hazardous operations and situations.

All personnel performing installation, operations, repair or maintenance on this EZ Torque must have knowledge of rig procedure. All crew in the vicinity of operations should be trained on rig safety and tool operation.



If unusual noises are heard (pings or snaps) or if the tong movement is unusually slow, fast or jerky, cease operation of the EZ Torque until the cause is determined and corrected

# SPECIFICATIONS

| Item     | Bore | Stroke | Full stroke* | Max pull force | Max operating pressure | Piston area | Torque Range (ft/lbs)** | Weight (approx) |
|----------|------|--------|--------------|----------------|------------------------|-------------|-------------------------|-----------------|
| Cylinder | 6"   | 24.5"  | 45"          | 35343 lbs      | 2500 psi               | 14.14 sq in | 40 to 170,000           | 750 lbs         |

\*wireline travel

\*\*recommend verifying torque setting with a load cell

Table 2

| Item                 | Internal Set Pressures |          | Max operating pressure | Reservoir Capacity | Weight (approx) |
|----------------------|------------------------|----------|------------------------|--------------------|-----------------|
|                      | Main relief            | Unloader |                        |                    |                 |
| Hydraulic Power Unit | 2750 psi               | 700 psi  | 2500 psi               | 30 gallons         | 800 lbs*        |

\*dry

Table 3

| Hydraulic Power Unit (HPU) |  | Amps |
|----------------------------|--|------|
| 460 volts                  |  | 12.8 |
| 230 volts                  |  | 25.5 |
| 220 volts                  |  | 31.3 |

Table 4

| HPU Power frequency | Speed (rpm) | Pres- sure (psi) | Flow Rate (gpm) | Pres- sure (psi) | Flow Rate (gpm) |
|---------------------|-------------|------------------|-----------------|------------------|-----------------|
|                     |             | Output           |                 | Output           |                 |
| 60 hz               | 1760        | 700              | 18.89           | 2500             | 4.73            |
| 50 hz               | 1445        |                  | 15.51           |                  | 3.88            |

Table 5

Specifications continued

| TONG LENGTH       |              | 24"           | 30"   | 36"   | 42"   | 44"   | 48"   | 50"   | 54"   | 58"   |
|-------------------|--------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| PRESSURE,<br>PSIG | PULL,<br>LBS | TORQUE FT-LBS |       |       |       |       |       |       |       |       |
| 25                | 353          | 707           | 884   | 1060  | 1237  | 1296  | 1414  | 1473  | 1590  | 1708  |
| 50                | 707          | 1414          | 1767  | 2121  | 2474  | 2592  | 2827  | 2945  | 3181  | 3416  |
| 75                | 1060         | 2121          | 2651  | 3181  | 3711  | 3888  | 4241  | 4418  | 4771  | 5125  |
| 100               | 1414         | 2827          | 3534  | 4241  | 4948  | 5184  | 5655  | 5890  | 6362  | 6833  |
| 125               | 1767         | 3534          | 4418  | 5301  | 6185  | 6479  | 7069  | 7363  | 7952  | 8541  |
| 150               | 2121         | 4241          | 5301  | 6362  | 7422  | 7775  | 8482  | 8836  | 9542  | 10249 |
| 175               | 2474         | 4948          | 6185  | 7422  | 8659  | 9071  | 9896  | 10308 | 11133 | 11958 |
| 200               | 2827         | 5655          | 7069  | 8482  | 9896  | 10367 | 11310 | 11781 | 12723 | 13666 |
| 225               | 3181         | 6362          | 7952  | 9542  | 11133 | 11663 | 12723 | 13253 | 14314 | 15374 |
| 250               | 3534         | 7069          | 8836  | 10603 | 12370 | 12959 | 14137 | 14726 | 15904 | 17082 |
| 275               | 3888         | 7775          | 9719  | 11663 | 13607 | 14255 | 15551 | 16199 | 17495 | 18790 |
| 300               | 4241         | 8482          | 10603 | 12723 | 14844 | 15551 | 16964 | 17671 | 19085 | 20499 |
| 325               | 4595         | 9189          | 11486 | 13784 | 16081 | 16847 | 18378 | 19144 | 20675 | 22207 |
| 350               | 4948         | 9896          | 12370 | 14844 | 17318 | 18142 | 19792 | 20616 | 22266 | 23915 |
| 375               | 5301         | 10603         | 13253 | 15904 | 18555 | 19438 | 21206 | 22089 | 23856 | 25623 |
| 400               | 5655         | 11310         | 14137 | 16964 | 19792 | 20734 | 22619 | 23562 | 25447 | 27332 |
| 425               | 6008         | 12016         | 15021 | 18025 | 21029 | 22030 | 24033 | 25034 | 27037 | 29040 |
| 450               | 6362         | 12723         | 15904 | 19085 | 22266 | 23326 | 25447 | 26507 | 28627 | 30748 |
| 475               | 6715         | 13430         | 16788 | 20145 | 23503 | 24622 | 26860 | 27979 | 30218 | 32456 |
| 500               | 7069         | 14137         | 17671 | 21206 | 24740 | 25918 | 28274 | 29452 | 31808 | 34164 |
| 525               | 7422         | 14844         | 18555 | 22266 | 25977 | 27214 | 29688 | 30925 | 33399 | 35873 |
| 550               | 7775         | 15551         | 19438 | 23326 | 27214 | 28510 | 31101 | 32397 | 34989 | 37581 |
| 575               | 8129         | 16258         | 20322 | 24386 | 28451 | 29806 | 32515 | 33870 | 36579 | 39289 |
| 600               | 8482         | 16964         | 21206 | 25447 | 29688 | 31101 | 33929 | 35343 | 38170 | 40997 |
| 625               | 8836         | 17671         | 22089 | 26507 | 30925 | 32397 | 35343 | 36815 | 39760 | 42706 |
| 650               | 9189         | 18378         | 22973 | 27567 | 32162 | 33693 | 36756 | 38288 | 41351 | 44414 |
| 675               | 9542         | 19085         | 23856 | 28627 | 33399 | 34989 | 38170 | 39760 | 42941 | 46122 |
| 700               | 9896         | 19792         | 24740 | 29688 | 34636 | 36285 | 39584 | 41233 | 44532 | 47830 |
| 725               | 10249        | 20499         | 25623 | 30748 | 35873 | 37581 | 40997 | 42706 | 46122 | 49538 |
| 750               | 10603        | 21206         | 26507 | 31808 | 37110 | 38877 | 42411 | 44178 | 47712 | 51247 |
| 775               | 10956        | 21912         | 27390 | 32869 | 38347 | 40173 | 43825 | 45651 | 49303 | 52955 |
| 800               | 11310        | 22619         | 28274 | 33929 | 39584 | 41469 | 45238 | 47123 | 50893 | 54663 |
| 825               | 11663        | 23326         | 29158 | 34989 | 40821 | 42764 | 46652 | 48596 | 52484 | 56371 |
| 850               | 12016        | 24033         | 30041 | 36049 | 42058 | 44060 | 48066 | 50069 | 54074 | 58080 |
| 875               | 12370        | 24740         | 30925 | 37110 | 43295 | 45356 | 49480 | 51541 | 55664 | 59788 |
| 900               | 12723        | 25447         | 31808 | 38170 | 44532 | 46652 | 50893 | 53014 | 57255 | 61496 |
| 925               | 13077        | 26153         | 32692 | 39230 | 45769 | 47948 | 52307 | 54486 | 58845 | 63204 |
| 950               | 13430        | 26860         | 33575 | 40290 | 47006 | 49244 | 53721 | 55959 | 60436 | 64912 |
| 975               | 13784        | 27567         | 34459 | 41351 | 48243 | 50540 | 55134 | 57432 | 62026 | 66621 |
| 1000              | 14137        | 28274         | 35343 | 42411 | 49480 | 51836 | 56548 | 58904 | 63617 | 68329 |
| 1025              | 14490        | 28981         | 36226 | 43471 | 50716 | 53132 | 57962 | 60377 | 65207 | 70037 |
| 1050              | 14844        | 29688         | 37110 | 44532 | 51953 | 54427 | 59375 | 61849 | 66797 | 71745 |
| 1075              | 15197        | 30395         | 37993 | 45592 | 53190 | 55723 | 60789 | 63322 | 68388 | 73453 |
| 1100              | 15551        | 31101         | 38877 | 46652 | 54427 | 57019 | 62203 | 64795 | 69978 | 75162 |
| 1125              | 15904        | 31808         | 39760 | 47712 | 55664 | 58315 | 63617 | 66267 | 71569 | 76870 |
| 1150              | 16258        | 32515         | 40644 | 48773 | 56901 | 59611 | 65030 | 67740 | 73159 | 78578 |
| 1175              | 16611        | 33222         | 41527 | 49833 | 58138 | 60907 | 66444 | 69212 | 74749 | 80286 |

Table 6; Calibration

| TONG LENGTH       |              | 24"           | 30"   | 36"    | 42"    | 44"    | 48"    | 50"    | 54"    | 58"    |
|-------------------|--------------|---------------|-------|--------|--------|--------|--------|--------|--------|--------|
| PRESSURE,<br>PSIG | PULL,<br>LBS | TORQUE FT-LBS |       |        |        |        |        |        |        |        |
| 1200              | 16964        | 33929         | 42411 | 50893  | 59375  | 62203  | 67858  | 70685  | 76340  | 81995  |
| 1225              | 17318        | 34636         | 43295 | 51953  | 60612  | 63499  | 69271  | 72158  | 77930  | 83703  |
| 1250              | 17671        | 35343         | 44178 | 53014  | 61849  | 64795  | 70685  | 73630  | 79521  | 85411  |
| 1275              | 18025        | 36049         | 45062 | 54074  | 63086  | 66090  | 72099  | 75103  | 81111  | 87119  |
| 1300              | 18378        | 36756         | 45945 | 55134  | 64323  | 67386  | 73512  | 76575  | 82701  | 88827  |
| 1325              | 18732        | 37463         | 46829 | 56195  | 65560  | 68682  | 74926  | 78048  | 84292  | 90536  |
| 1350              | 19085        | 38170         | 47712 | 57255  | 66797  | 69978  | 76340  | 79521  | 85882  | 92244  |
| 1375              | 19438        | 38877         | 48596 | 58315  | 68034  | 71274  | 77754  | 80993  | 87473  | 93952  |
| 1400              | 19792        | 39584         | 49480 | 59375  | 69271  | 72570  | 79167  | 82466  | 89063  | 95660  |
| 1425              | 20145        | 40290         | 50363 | 60436  | 70508  | 73866  | 80581  | 83938  | 90654  | 97369  |
| 1450              | 20499        | 40997         | 51247 | 61496  | 71745  | 75162  | 81995  | 85411  | 92244  | 99077  |
| 1475              | 20852        | 41704         | 52130 | 62556  | 72982  | 76458  | 83408  | 86884  | 93834  | 100785 |
| 1500              | 21206        | 42411         | 53014 | 63617  | 74219  | 77754  | 84822  | 88356  | 95425  | 102493 |
| 1525              | 21559        | 43118         | 53897 | 64677  | 75456  | 79049  | 86236  | 89829  | 97015  | 104201 |
| 1550              | 21912        | 43825         | 54781 | 65737  | 76693  | 80345  | 87649  | 91301  | 98606  | 105910 |
| 1575              | 22266        | 44532         | 55664 | 66797  | 77930  | 81641  | 89063  | 92774  | 100196 | 107618 |
| 1600              | 22619        | 45238         | 56548 | 67858  | 79167  | 82937  | 90477  | 94247  | 101786 | 109326 |
| 1625              | 22973        | 45945         | 57432 | 68918  | 80404  | 84233  | 91891  | 95719  | 103377 | 111034 |
| 1650              | 23326        | 46652         | 58315 | 69978  | 81641  | 85529  | 93304  | 97192  | 104967 | 112743 |
| 1675              | 23679        | 47359         | 59199 | 71038  | 82878  | 86825  | 94718  | 98664  | 106558 | 114451 |
| 1700              | 24033        | 48066         | 60082 | 72099  | 84115  | 88121  | 96132  | 100137 | 108148 | 116159 |
| 1725              | 24386        | 48773         | 60966 | 73159  | 85352  | 89417  | 97545  | 101610 | 109738 | 117867 |
| 1750              | 24740        | 49480         | 61849 | 74219  | 86589  | 90712  | 98959  | 103082 | 111329 | 119575 |
| 1775              | 25093        | 50186         | 62733 | 75280  | 87826  | 92008  | 100373 | 104555 | 112919 | 121284 |
| 1800              | 25447        | 50893         | 63617 | 76340  | 89063  | 93304  | 101786 | 106028 | 114510 | 122992 |
| 1825              | 25800        | 51600         | 64500 | 77400  | 90300  | 94600  | 103200 | 107500 | 116100 | 124700 |
| 1850              | 26153        | 52307         | 65384 | 78460  | 91537  | 95896  | 104614 | 108973 | 117691 | 126408 |
| 1875              | 26507        | 53014         | 66267 | 79521  | 92774  | 97192  | 106028 | 110445 | 119281 | 128117 |
| 1900              | 26860        | 53721         | 67151 | 80581  | 94011  | 98488  | 107441 | 111918 | 120871 | 129825 |
| 1925              | 27214        | 54427         | 68034 | 81641  | 95248  | 99784  | 108855 | 113391 | 122462 | 131533 |
| 1950              | 27567        | 55134         | 68918 | 82701  | 96485  | 101080 | 110269 | 114863 | 124052 | 133241 |
| 1975              | 27921        | 55841         | 69801 | 83762  | 97722  | 102375 | 111682 | 116336 | 125643 | 134949 |
| 2000              | 28274        | 56548         | 70685 | 84822  | 98959  | 103671 | 113096 | 117808 | 127233 | 136658 |
| 2025              | 28627        | 57255         | 71569 | 85882  | 100196 | 104967 | 114510 | 119281 | 128823 | 138366 |
| 2050              | 28981        | 57962         | 72452 | 86943  | 101433 | 106263 | 115923 | 120754 | 130414 | 140074 |
| 2075              | 29334        | 58669         | 73336 | 88003  | 102670 | 107559 | 117337 | 122226 | 132004 | 141782 |
| 2100              | 29688        | 59375         | 74219 | 89063  | 103907 | 108855 | 118751 | 123699 | 133595 | 143491 |
| 2125              | 30041        | 60082         | 75103 | 90123  | 105144 | 110151 | 120165 | 125171 | 135185 | 145199 |
| 2150              | 30395        | 60789         | 75986 | 91184  | 106381 | 111447 | 121578 | 126644 | 136775 | 146907 |
| 2175              | 30748        | 61496         | 76870 | 92244  | 107618 | 112743 | 122992 | 128117 | 138366 | 148615 |
| 2200              | 31101        | 62203         | 77754 | 93304  | 108855 | 114038 | 124406 | 129589 | 139956 | 150323 |
| 2225              | 31455        | 62910         | 78637 | 94364  | 110092 | 115334 | 125819 | 131062 | 141547 | 152032 |
| 2250              | 31808        | 63617         | 79521 | 95425  | 111329 | 116630 | 127233 | 132534 | 143137 | 153740 |
| 2275              | 32162        | 64323         | 80404 | 96485  | 112566 | 117926 | 128647 | 134007 | 144728 | 155448 |
| 2300              | 32515        | 65030         | 81288 | 97545  | 113803 | 119222 | 130060 | 135480 | 146318 | 157156 |
| 2325              | 32869        | 65737         | 82171 | 98606  | 115040 | 120518 | 131474 | 136952 | 147908 | 158865 |
| 2350              | 33222        | 66444         | 83055 | 99666  | 116277 | 121814 | 132888 | 138425 | 149499 | 160573 |
| 2375              | 33575        | 67151         | 83938 | 100726 | 117514 | 123110 | 134302 | 139897 | 151089 | 162281 |

Table 6; Calibration continued

## Specifications continued

| TONG LENGTH       |              | 24"           | 30"   | 36"    | 42"    | 44"    | 48"    | 50"    | 54"    | 58"    |
|-------------------|--------------|---------------|-------|--------|--------|--------|--------|--------|--------|--------|
| PRESSURE,<br>PSIG | PULL,<br>LBS | TORQUE FT-LBS |       |        |        |        |        |        |        |        |
| 2400              | 33929        | 67858         | 84822 | 101786 | 118751 | 124406 | 135715 | 141370 | 152680 | 163989 |
| 2425              | 34282        | 68564         | 85706 | 102847 | 119988 | 125702 | 137129 | 142843 | 154270 | 165697 |
| 2450              | 34636        | 69271         | 86589 | 103907 | 121225 | 126997 | 138543 | 144315 | 155860 | 167406 |
| 2475              | 34989        | 69978         | 87473 | 104967 | 122462 | 128293 | 139956 | 145788 | 157451 | 169114 |
| 2500              | 35343        | 70685         | 88356 | 106028 | 123699 | 129589 | 141370 | 147260 | 159041 | 170822 |

Table 6; Calibration continued

The torque calculation is based on the use of a thread compound containing 40 to 60% by weight of zinc, or 60% by weight of lead, applied thoroughly.

| Size and Type<br>of Connection                                             | OD<br>(in) | Bore of Drill Collars (in) |        |        |        |                                                                                  |        |        |          |
|----------------------------------------------------------------------------|------------|----------------------------|--------|--------|--------|----------------------------------------------------------------------------------|--------|--------|----------|
|                                                                            |            | 1                          | 1-1/4" | 1-1/2" | 1-3/4" | 2"                                                                               | 2-1/4" | 2-1/2" | 2-13/16" |
| API N. C. 23                                                               | 3"         | 2500+                      | 2500+  | 2500+  |        | Note 1: The 2-7/8" P.A.C<br>makeup torque is based on<br>87,500 psi stress       |        |        |          |
|                                                                            | 3-1/8"     | 3300+                      | 3300+  | 2600   |        |                                                                                  |        |        |          |
|                                                                            | 3-1/4"     | 4000                       | 3400   | 2600   |        |                                                                                  |        |        |          |
| 2-7/8 P.A.C.<br>(See Note 1)                                               | 3"         |                            | 3800+  | 3800+  | 2900   | Note 2: The H-90<br>connection makeup torque<br>is based on 56,250 psi<br>stress |        |        |          |
|                                                                            | 3-1/8"     |                            | 4900+  | 4200   | 2900   |                                                                                  |        |        |          |
|                                                                            | 3-1/4"     |                            | 5200   | 4200   | 2900   |                                                                                  |        |        |          |
| 2-3/8" API I.F. or<br>API N.C. 26 or<br>2-7/8" Slim Hole                   | 3-1/2"     |                            | 4600+  | 4600+  | 3700   |                                                                                  |        |        |          |
|                                                                            | 3-3/4"     |                            | 5500   | 4700   | 3700   |                                                                                  |        |        |          |
| 2-7/8" Extra Hole or<br>3-1/2" DbL.<br>Streamline<br>or 2-7/8" Mod<br>Open | 3-3/4"     |                            | 4100+  | 4100+  | 4100+  |                                                                                  |        |        |          |
|                                                                            | 3-7/8"     |                            | 5300+  | 5300+  | 5300+  |                                                                                  |        |        |          |
|                                                                            | 4-1/8"     |                            | 8000+  | 8000+  | 7400   |                                                                                  |        |        |          |
| 2-7/8" API I.F. or<br>API N.C. 31 or<br>3-1/2" Slim Hole                   | 3-7/8"     |                            | 4600+  | 4600+  | 4600+  | 4600+                                                                            |        |        |          |
|                                                                            | 4-1/8"     |                            | 7300+  | 7300+  | 7300+  | 6800                                                                             |        |        |          |
|                                                                            | 4-1/4"     |                            | 8800+  | 8800+  | 8100   | 6800                                                                             |        |        |          |
|                                                                            | 4-1/2"     |                            | 10000  | 9300   | 8100   | 6800                                                                             |        |        |          |
| API N.C. 35                                                                | 4-1/2"     |                            |        |        | 8900+  | 8900+                                                                            | 8900+  | 7400   |          |
|                                                                            | 4-3/4"     |                            |        |        | 12100  | 10800                                                                            | 9200   | 7400   |          |
|                                                                            | 5"         |                            |        |        | 12100  | 10800                                                                            | 9200   | 7400   |          |
| 3-1/2" Extra Hole or<br>4" Slim Hole or<br>3-1/2" Mod Open                 | 4-1/4"     |                            |        |        | 5100+  | 5100+                                                                            | 5100+  | 5100+  |          |
|                                                                            | 4-1/2"     |                            |        |        | 8400+  | 8400+                                                                            | 8400+  | 8200   |          |
|                                                                            | 4-3/4"     |                            |        |        | 11900+ | 11700                                                                            | 10000  | 8200   |          |
|                                                                            | 5"         |                            |        |        | 13200  | 11700                                                                            | 10000  | 8200   |          |
| 3-1/2" API I.F. or<br>API N.C. 38 or<br>4-1/2" Slim Hole                   | 5-1/4"     |                            |        |        | 13200  | 11700                                                                            | 10000  | 8200   |          |
|                                                                            | 4-3/4"     |                            |        |        | 9900+  | 9900+                                                                            | 9900+  | 9900+  | 8300     |
|                                                                            | 5"         |                            |        |        | 13800+ | 13800+                                                                           | 12800  | 10900  | 8300     |
|                                                                            | 5-1/4"     |                            |        |        | 16000  | 14600                                                                            | 12800  | 10900  | 8300     |
| 4-1/2" Slim Hole                                                           | 5-1/2"     |                            |        |        | 16000  | 14600                                                                            | 12800  | 10900  | 8300     |

Table 7; Recommended makeup torque

| Size and Type<br>of Connection                                                                       | OD<br>(in) | Bore of Drill Collars (in) |        |        |          |        |        |        |        |
|------------------------------------------------------------------------------------------------------|------------|----------------------------|--------|--------|----------|--------|--------|--------|--------|
|                                                                                                      |            | 2"                         | 2-1/4" | 2-1/2" | 2-13/16" | 3"     | 3-1/4" | 3-1/2" | 3-3/4" |
| 3-1/2" H-90<br>(See Note 2)                                                                          | 4-3/4"     |                            |        |        | 8700+    | 8700+  | 8700+  | 8700+  | 8700+  |
|                                                                                                      | 5"         |                            |        |        | 12700+   | 12700+ | 12700+ | 12700+ | 10400  |
|                                                                                                      | 5-1/4"     |                            |        |        | 16900+   | 16700  | 15000  | 13100  | 10400  |
|                                                                                                      | 5-1/2"     |                            |        |        | 18500    | 16700  | 15000  | 13100  | 10400  |
| 4" Full Hole or<br>API N.C. 40 or<br>4" Mod Open or<br>4-1/2" Dbl.<br>Streamline                     | 5"         |                            |        |        | 10800+   | 10800+ | 10800+ | 10800+ | 10800+ |
|                                                                                                      | 5-1/4"     |                            |        |        | 15100+   | 15100+ | 15100+ | 14800  | 12100  |
|                                                                                                      | 5-1/2"     |                            |        |        | 19700+   | 18600  | 16900  | 14800  | 12100  |
|                                                                                                      | 5-3/4"     |                            |        |        | 20400    | 18600  | 16900  | 14800  | 12100  |
| 4 H-90<br>(See Note 2)                                                                               | 6"         |                            |        |        | 20400    | 18600  | 16900  | 14800  | 12100  |
|                                                                                                      | 5-1/4"     |                            |        |        |          | 12500+ | 12500+ | 12500+ | 12500+ |
|                                                                                                      | 5-1/2"     |                            |        |        |          | 17300+ | 17300+ | 17300+ | 16500  |
|                                                                                                      | 5-3/4"     |                            |        |        |          | 22300+ | 21500  | 19400  | 16500  |
| 4-1/2" API Regular                                                                                   | 6"         |                            |        |        |          | 23500  | 21500  | 19400  | 16500  |
|                                                                                                      | 6-1/4"     |                            |        |        |          | 23500  | 21500  | 19400  | 16500  |
|                                                                                                      | 5-1/2"     |                            |        |        |          | 15400+ | 15400+ | 15400+ | 15400+ |
|                                                                                                      | 5-3/4"     |                            |        |        |          | 20300+ | 20300+ | 19400  | 16200  |
| API N.C. 44                                                                                          | 6"         |                            |        |        |          | 23400  | 21600  | 19400  | 16200  |
|                                                                                                      | 6-1/4"     |                            |        |        |          | 23400  | 21600  | 19400  | 16200  |
|                                                                                                      | 5-3/4"     | 20600+                     | 20600+ | 20600+ | 18000    |        |        |        |        |
|                                                                                                      | 6"         | 25000                      | 23300  | 21200  | 18000    |        |        |        |        |
| 4-1/2" API<br>Full Hole                                                                              | 6-1/4"     | 25000                      | 23300  | 21200  | 18000    |        |        |        |        |
|                                                                                                      | 6-1/2"     | 25000                      | 23300  | 21200  | 18000    |        |        |        |        |
|                                                                                                      | 5-1/2"     | 12900+                     | 12900+ | 12900+ | 12900+   | 12900+ |        |        |        |
|                                                                                                      | 5-3/4"     | 17900+                     | 17900+ | 17900+ | 17900+   | 17700  |        |        |        |
| 4-1/2" Extra Hole<br>or API N.C. 46 or<br>4" API I.F. or 5"<br>Dbl. Streamline or<br>4-1/2" Mod Open | 6"         |                            |        |        |          |        |        |        |        |
|                                                                                                      | 6-1/4"     |                            |        |        |          |        |        |        |        |
|                                                                                                      | 6-1/2"     |                            |        |        |          |        |        |        |        |
|                                                                                                      | 6-3/4"     |                            |        |        |          |        |        |        |        |
| 4-1/2" H-90<br>(See Note 2)                                                                          | 5-3/4"     |                            | 17600+ | 17600+ | 17600+   | 17600+ |        |        |        |
|                                                                                                      | 6"         |                            | 23200+ | 23200+ | 22200    | 20200  |        |        |        |
|                                                                                                      | 6-1/4"     |                            | 28000  | 25500  | 22200    | 20200  |        |        |        |
|                                                                                                      | 6-1/2"     |                            | 28000  | 25500  | 22200    | 20200  |        |        |        |
| 4-1/2" H-90<br>(See Note 2)                                                                          | 6-3/4"     |                            | 28000  | 25500  | 22200    | 20200  |        |        |        |
|                                                                                                      | 5-3/4"     |                            | 17600+ | 17600+ | 17600+   | 17600+ |        |        |        |
|                                                                                                      | 6"         |                            | 23400+ | 23400+ | 23000    | 21000  |        |        |        |
|                                                                                                      | 6-1/4"     |                            | 28500  | 26000  | 23000    | 21000  |        |        |        |
| 4-1/2" H-90<br>(See Note 2)                                                                          | 6-1/2"     |                            | 28500  | 26000  | 23000    | 21000  |        |        |        |
|                                                                                                      | 6-3/4"     |                            | 28500  | 26000  | 23000    | 21000  |        |        |        |

Table 7; Recommended makeup torque continued

Specifications continued

| Size and Type<br>of Connection                                                                            | OD<br>(in) | Bore of Drill Collars (in) |        |        |          |        |        |        |        |
|-----------------------------------------------------------------------------------------------------------|------------|----------------------------|--------|--------|----------|--------|--------|--------|--------|
|                                                                                                           |            | 2"                         | 2-1/4" | 2-1/2" | 2-13/16" | 3"     | 3-1/4" | 3-1/2" | 3-3/4" |
| 5 H-90<br>(See Note 2)                                                                                    | 6-1/4"     |                            | 25000+ | 25000+ | 25000+   | 25000+ |        |        |        |
|                                                                                                           | 6-1/2"     |                            | 31500+ | 31500+ | 29500    | 27000  |        |        |        |
|                                                                                                           | 6-3/4"     |                            | 35000  | 33000  | 29500    | 27000  |        |        |        |
|                                                                                                           | 7"         |                            | 35000  | 33000  | 29500    | 27000  |        |        |        |
| 5-1/2" H-90<br>(See Note 2)                                                                               | 6-3/4"     |                            | 34000+ | 34000+ | 34000+   | 34000  |        |        |        |
|                                                                                                           | 7"         |                            | 41500+ | 40000  | 36500    | 34000  |        |        |        |
|                                                                                                           | 7-1/4"     |                            | 42500  | 40000  | 36500    | 34000  |        |        |        |
|                                                                                                           | 7-1/2"     |                            | 42500  | 40000  | 36500    | 34000  |        |        |        |
| 5-1/2" API Regular                                                                                        | 6-3/4"     |                            | 31500+ | 31500+ | 31500+   | 31500+ |        |        |        |
|                                                                                                           | 7"         |                            | 39000+ | 39000+ | 36000    | 33500  |        |        |        |
|                                                                                                           | 7-1/4"     |                            | 42000  | 39500  | 36000    | 33500  |        |        |        |
|                                                                                                           | 7-1/2"     |                            | 42000  | 39500  | 36000    | 33500  |        |        |        |
| 4-1/2" API I.F. or<br>API N.C. 50 or 5"<br>Extra Hole or 5"<br>Mod. Open or 5-<br>1/2"<br>Dbl. Streamline | 6-1/4"     |                            | 22800+ | 22800+ | 22800+   | 22800+ | 22800+ |        |        |
|                                                                                                           | 6-1/2"     |                            | 29500+ | 29500+ | 29500+   | 29500+ | 26500  |        |        |
|                                                                                                           | 6-3/4"     |                            | 36000+ | 35500  | 32000    | 30000  | 26500  |        |        |
|                                                                                                           | 7"         |                            | 38000  | 35500  | 32000    | 30000  | 26500  |        |        |
|                                                                                                           | 7-1/4"     |                            | 38000  | 35500  | 32000    | 30000  | 26500  |        |        |
| 5-1/2" API Full<br>Hole                                                                                   | 7"         |                            |        | 32500+ | 32500+   | 32500+ | 32500+ |        |        |
|                                                                                                           | 7-1/4"     |                            |        | 40500+ | 40500+   | 40500+ | 40500+ |        |        |
|                                                                                                           | 7-1/2"     |                            |        | 49000+ | 47000    | 45000  | 41500  |        |        |
|                                                                                                           | 7-3/4"     |                            |        | 51000  | 47000    | 45000  | 41500  |        |        |
| API N.C. 56                                                                                               | 7-1/4"     |                            |        | 40000+ | 40000+   | 40000+ | 40000+ |        |        |
|                                                                                                           | 7-1/2"     |                            |        | 48500+ | 48000    | 45000  | 42000  |        |        |
|                                                                                                           | 7-3/4"     |                            |        | 51000  | 48000    | 45000  | 42000  |        |        |
|                                                                                                           | 8"         |                            |        | 51000  | 48000    | 45000  | 42000  |        |        |
| 6-5/8" API Regular                                                                                        | 7-1/2"     |                            |        | 46000+ | 46000+   | 46000+ | 46000+ |        |        |
|                                                                                                           | 7-3/4"     |                            |        | 55000+ | 53000    | 50000  | 47000  |        |        |
|                                                                                                           | 8"         |                            |        | 57000  | 53000    | 50000  | 47000  |        |        |
|                                                                                                           | 8-1/4"     |                            |        | 57000  | 53000    | 50000  | 47000  |        |        |
| 6-5/8" H-90<br>(See Note 2)                                                                               | 7-1/2"     |                            |        | 46000+ | 46000+   | 46000+ | 46000+ |        |        |
|                                                                                                           | 7-3/4"     |                            |        | 55000+ | 55000+   | 53000  | 49500  |        |        |
|                                                                                                           | 8"         |                            |        | 59500  | 56000    | 53000  | 49500  |        |        |
|                                                                                                           | 8-1/4"     |                            |        | 59500  | 56000    | 53000  | 49500  |        |        |
| API N.C. 61                                                                                               | 8"         |                            |        | 54000+ | 54000+   | 54000+ | 54000+ |        |        |
|                                                                                                           | 8-1/4"     |                            |        | 64000+ | 64000+   | 64000+ | 61000  |        |        |
|                                                                                                           | 8-1/2"     |                            |        | 72000  | 68000    | 65000  | 61000  |        |        |
|                                                                                                           | 8-3/4"     |                            |        | 72000  | 68000    | 65000  | 61000  |        |        |
|                                                                                                           | 9"         |                            |        | 72000  | 68000    | 65000  | 61000  |        |        |

Table 7; Recommended makeup torque continued

| Size and Type<br>of Connection | OD<br>(in) | Bore of Drill Collars (in) |        |        |          |         |         |         |         |
|--------------------------------|------------|----------------------------|--------|--------|----------|---------|---------|---------|---------|
|                                |            | 2"                         | 2-1/4" | 2-1/2" | 2-13/16" | 3"      | 3-1/4"  | 3-1/2"  | 3-3/4"  |
| 5-1/2" API I.F.                | 8"         |                            |        | 56000+ | 56000+   | 56000+  | 56000+  | 56000+  |         |
|                                | 8-1/4"     |                            |        | 66000+ | 66000+   | 66000+  | 63000   | 59000   |         |
|                                | 8-1/2"     |                            |        | 74000  | 70000    | 67000   | 63000   | 59000   |         |
|                                | 8-3/4"     |                            |        | 74000  | 70000    | 67000   | 63000   | 59000   |         |
|                                | 9"         |                            |        | 74000  | 70000    | 67000   | 63000   | 59000   |         |
|                                | 9-1/4"     |                            |        | 74000  | 70000    | 67000   | 63000   | 59000   |         |
| 6-5/8" API Full<br>Hole        | 8-1/2"     |                            |        |        | 67000+   | 67000+  | 67000+  | 67000+  | 66500   |
|                                | 8-3/4"     |                            |        |        | 78000+   | 78000+  | 76000   | 72000   | 66500   |
|                                | 9"         |                            |        |        | 83000    | 80000   | 76000   | 72000   | 66500   |
|                                | 9-1/4"     |                            |        |        | 83000    | 80000   | 76000   | 72000   | 66500   |
|                                | 9-1/2"     |                            |        |        | 83000    | 80000   | 76000   | 72000   | 66500   |
| API N.C. 70                    | 9"         |                            |        |        | 75000+   | 75000+  | 75000+  | 75000+  | 75000+  |
|                                | 9-1/4"     |                            |        |        | 88000+   | 88000+  | 88000+  | 88000+  | 88000+  |
|                                | 9-1/2"     |                            |        |        | 101000+  | 101000+ | 100000  | 95000   | 90000   |
|                                | 9-3/4"     |                            |        |        | 107000   | 105000  | 100000  | 95000   | 90000   |
|                                | 10"        |                            |        |        | 107000   | 105000  | 100000  | 95000   | 90000   |
|                                | 10-1/4"    |                            |        |        | 107000   | 105000  | 100000  | 95000   | 90000   |
| API N.C. 77                    | 10"        |                            |        |        |          | 107000+ | 107000+ | 107000+ | 107000+ |
|                                | 10-1/4"    |                            |        |        |          | 122000+ | 122000+ | 122000+ | 122000+ |
|                                | 10-1/2"    |                            |        |        |          | 138000+ | 138000+ | 133000  | 128000  |
|                                | 10-3/4"    |                            |        |        |          | 143000  | 138000  | 133000  | 128000  |
|                                | 11"        |                            |        |        |          | 143000  | 138000  | 133000  | 128000  |
| Connections with Full Face     |            |                            |        |        |          |         |         |         |         |
| 7" H-90<br>(See Note 2)        | 8"         |                            |        |        | 53000+   | 53000+  | 53000+  | 53000+  |         |
|                                | 8-1/4"     |                            |        |        | 63000+   | 63000+  | 63000+  | 60500   |         |
|                                | 8-1/2"     |                            |        |        | 71500    | 68500   | 65000   | 60500   |         |
| 7-5/8" API<br>Regular          | 8-1/2"     |                            |        |        |          | 60000+  | 60000+  | 60000+  | 60000+  |
|                                | 8-3/4"     |                            |        |        |          | 71000+  | 71000+  | 71000+  | 71000+  |
|                                | 9"         |                            |        |        |          | 83000+  | 83000+  | 79000   | 74000   |
|                                | 9-1/4"     |                            |        |        |          | 88000   | 83000   | 79000   | 74000   |
|                                | 9-1/2"     |                            |        |        |          | 88000   | 83000   | 79000   | 74000   |
| 7-5/8" H-90<br>(See Note 2)    | 9"         |                            |        |        |          | 72000+  | 72000+  | 72000+  | 72000+  |
|                                | 9-1/4"     |                            |        |        |          | 85500+  | 85500+  | 85500+  | 85500+  |
|                                | 9-1/2"     |                            |        |        |          | 98000+  | 98000+  | 98000+  | 95500   |
| 8-5/8" API<br>Regular          | 10"        |                            |        |        |          | 108000+ | 108000+ | 108000+ | 108000+ |
|                                | 10-1/4"    |                            |        |        |          | 123000+ | 123000+ | 123000+ | 123000  |
|                                | 10-1/2"    |                            |        |        |          | 139000  | 134000  | 129000  | 123000  |

Table 7; Recommended makeup torque continued

## Specifications continued

| Size and Type<br>of Connection   | OD<br>(in) | Bore of Drill Collars (in) |        |        |          |         |         |         |         |
|----------------------------------|------------|----------------------------|--------|--------|----------|---------|---------|---------|---------|
|                                  |            | 2"                         | 2-1/4" | 2-1/2" | 2-13/16" | 3"      | 3-1/4"  | 3-1/2"  | 3-3/4"  |
| Connections with Full Face       |            |                            |        |        |          |         |         |         |         |
| 8-5/8" H-90                      | 10-1/4"    |                            |        |        |          | 112500+ | 112500+ | 112500+ | 112500+ |
| (See Note 2)                     | 10-1/2"    |                            |        |        |          | 128500+ | 128500+ | 128500+ | 128500+ |
| Connections with Low Torque Face |            |                            |        |        |          |         |         |         |         |
| 7 H-90                           | 8-3/4"     |                            |        |        | 67500+   | 67500+  | 66500   | 62000   |         |
| (See Note 2)                     | 9"         |                            |        |        | 74000    | 71000   | 66500   | 62000   |         |
| 7-5/8" API Regular               | 9-1/4"     |                            |        |        |          | 72000+  | 72000+  | 72000+  | 72000+  |
|                                  | 9-1/2"     |                            |        |        |          | 85000+  | 85000+  | 82000   | 77000   |
|                                  | 9-3/4"     |                            |        |        |          | 91000   | 87000   | 82000   | 77000   |
|                                  | 10"        |                            |        |        |          | 91000   | 87000   | 82000   | 77000   |
| 7-5/8" H-90<br>(See Note 2)      | 9-3/4"     |                            |        |        |          | 91000+  | 91000+  | 91000+  | 91000+  |
|                                  | 10"        |                            |        |        |          | 105000+ | 105000+ | 103500  | 98000   |
|                                  | 10-1/4"    |                            |        |        |          | 112500  | 108000  | 103500  | 98000   |
|                                  | 10-1/2"    |                            |        |        |          | 112500  | 108000  | 103500  | 98000   |
| 8-5/8" API Regular               | 10-3/4"    |                            |        |        |          | 112000+ | 112000+ | 112000+ | 112000+ |
|                                  | 11"        |                            |        |        |          | 129000+ | 129000+ | 129000+ | 129000+ |
| 8-5/8" H-90<br>(See Note 2)      | 10-3/4"    |                            |        |        |          | 92500+  | 92500+  | 92500+  | 92500+  |
|                                  | 11"        |                            |        |        |          | 110000+ | 110000+ | 110000+ | 110000+ |
|                                  | 11-1/4"    |                            |        |        |          | 128000+ | 128000+ | 128000+ | 128000+ |

Table 7; Recommended makeup torque continued



Do not exceed the system's rated pressure or over tighten fittings

## HYDRAULIC FLUID

The power unit during operation heats the hydraulic fluid. If the reservoir temperature (seen in Figure 2) exceeds 150 degrees Fahrenheit, shut down the unit and let it cool. If this happens regularly, have unit repaired.



Be careful not to expose skin to hot hydraulic fluid – it can scald

The hydraulic fluid may be under pressures as high as 2500 psi. Fluid can be sprayed some distance, creating a slip hazard. If a leak occurs, shut down the power unit immediately and repair. Hydraulic fluid can irritate the skin – for skin contact, wash and rinse the affected area. If fluid comes in eye contact, use an emergency



Figure 2

eyewash or flush with saline solution. If not available, flush with distilled or lastly, tap water. Seek medical attention after flushing.



Avoid the hydraulic fluid spray– it can be injected through the skin at high pressures

| Recommended Oils           |
|----------------------------|
| Mobil DTE 24               |
| Castrol Hyspin VG 32       |
| Royal Purple Syndraulic 32 |
| Shell Tellus 32            |
| PetroCanada Environ AW 32  |
| ISO viscosity grade 46*    |

\* for warmer climates

Table 8

## INSTALLATION

- 1) Location
  - 1a) find the right location(s) for the cylinder assembly and power unit
  - 1b) determine whether upright or inverted mounting is best in this application
  - 1c) build an appropriate bracing structure and install the cylinder
- 2) place the power unit, connect power, and make hydraulic connections to the cylinder and control box
- 3) install the wireline assembly
- 4) test the unit for proper operation

Locating the cylinder and power unit (1a) is a matter of function and safety. The cylinder, wireline and bracing should be aligned so that they will be in a straight line when the tong is at 90 degrees. While the cylinder will swivel on the backup post (and does in operation), the cylinder needs to start out aligned.

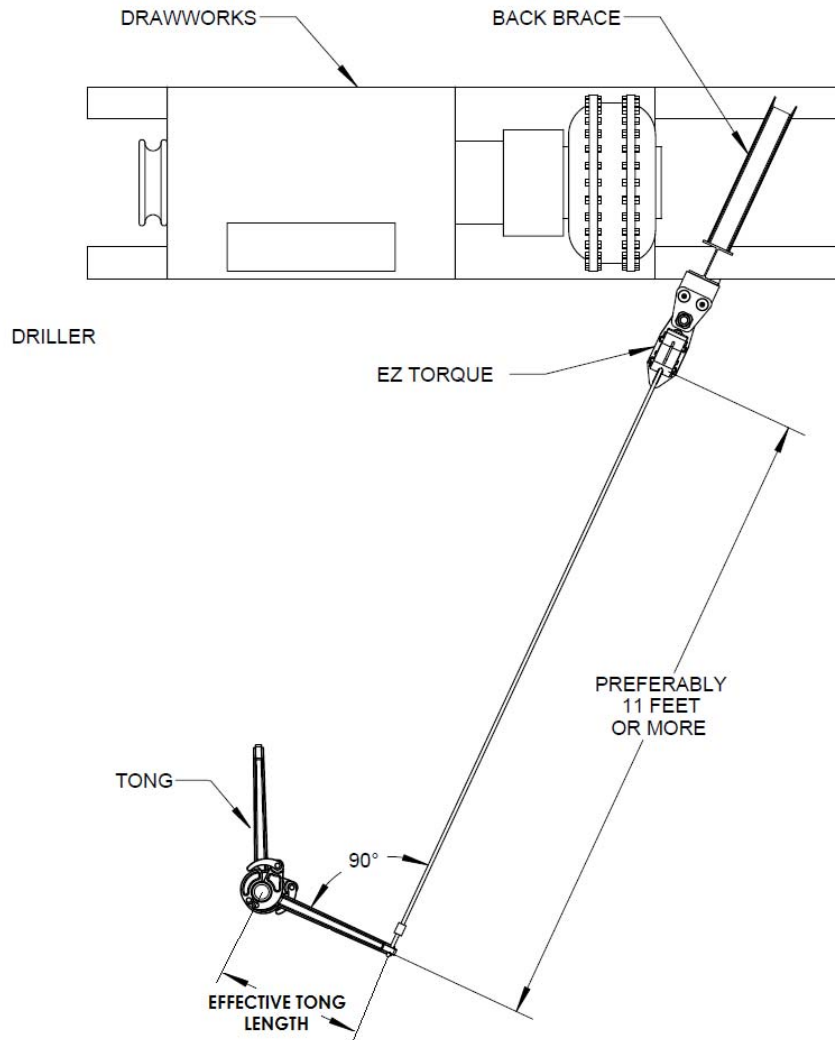


Figure 3

The longer the wireline is, the more efficient the cylinder will be – especially with shorter tongs. When the tong is at an angle other than 90 degrees the same line pull gives less torque. The wireline’s recommended minimum is eleven (11) feet.

The cylinder has a maximum pull of over 35,000 pounds of force. The cylinder location therefore must be tied to a structure capable of handling that force without damage or safety hazard. Drawworks skid beams are commonly used.

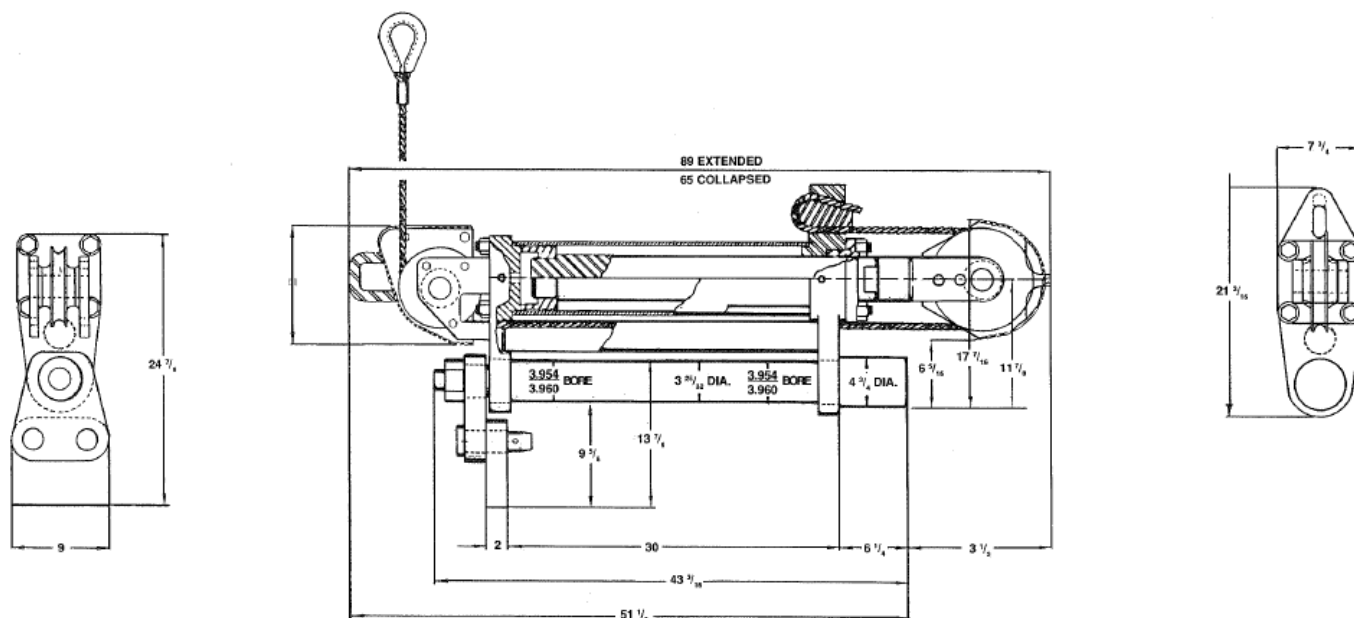


Figure 4: Cylinder dimensions

The cylinder extends 25". In the upright position, this typically requires a hole in the floor and no obstructions below. In the inverted position, clearance is needed overhead. The cable in either installation has to be at tony height. The upright position is preferred because it 1) takes the least space, 2) requires the least bracing material, 3) is easier to service, and 4) uses less connection hose. However, rig conditions may make the inverted installation more practical. The cylinder's supporting structure is not provided. See construction suggestions to follow.

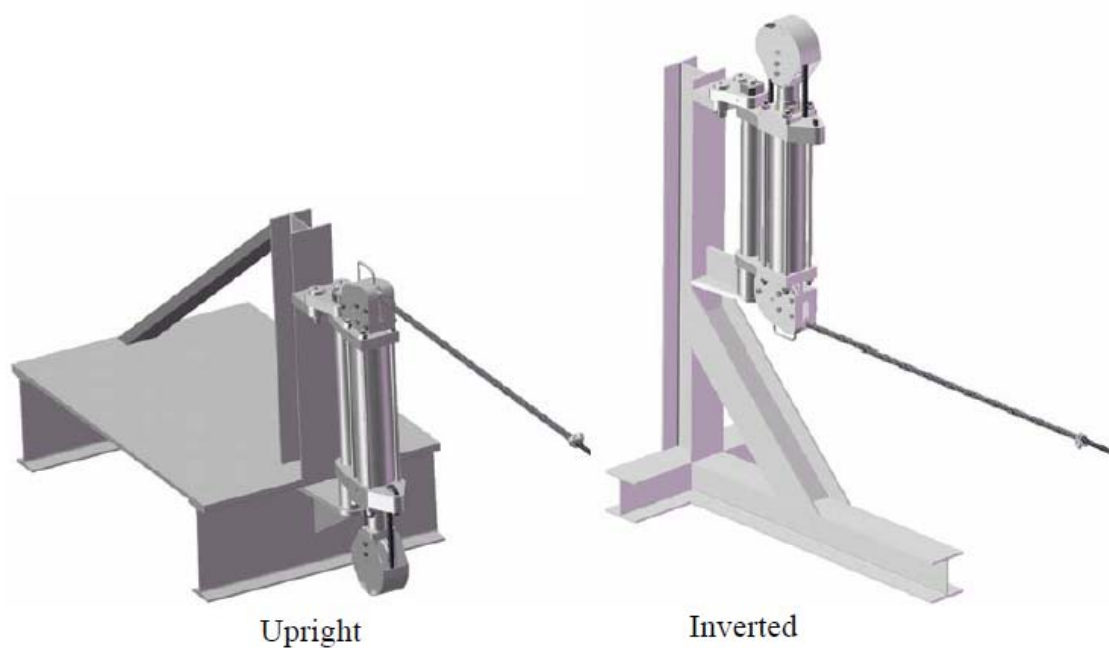


Figure 5: Cylinder installation

## Installation continued

All bracing structure material (1c) should be ASTM A36 or better and should be easily weldable. Side bracing must be added to ensure cylinder is in a straight line. The supplied anchor adapter plate and backup post are suitable for welding to bracing material and drawworks skid beams.



Welding to be performed by a qualified welder, utilizing proper materials and technique. Failure to properly weld the anchor adapter plate, the backup post, or the bracing structure could lead to failure of the cylinder unit causing serious or fatal injury or property damage. TIOT does not take responsibility for faulty welds or improper bracing

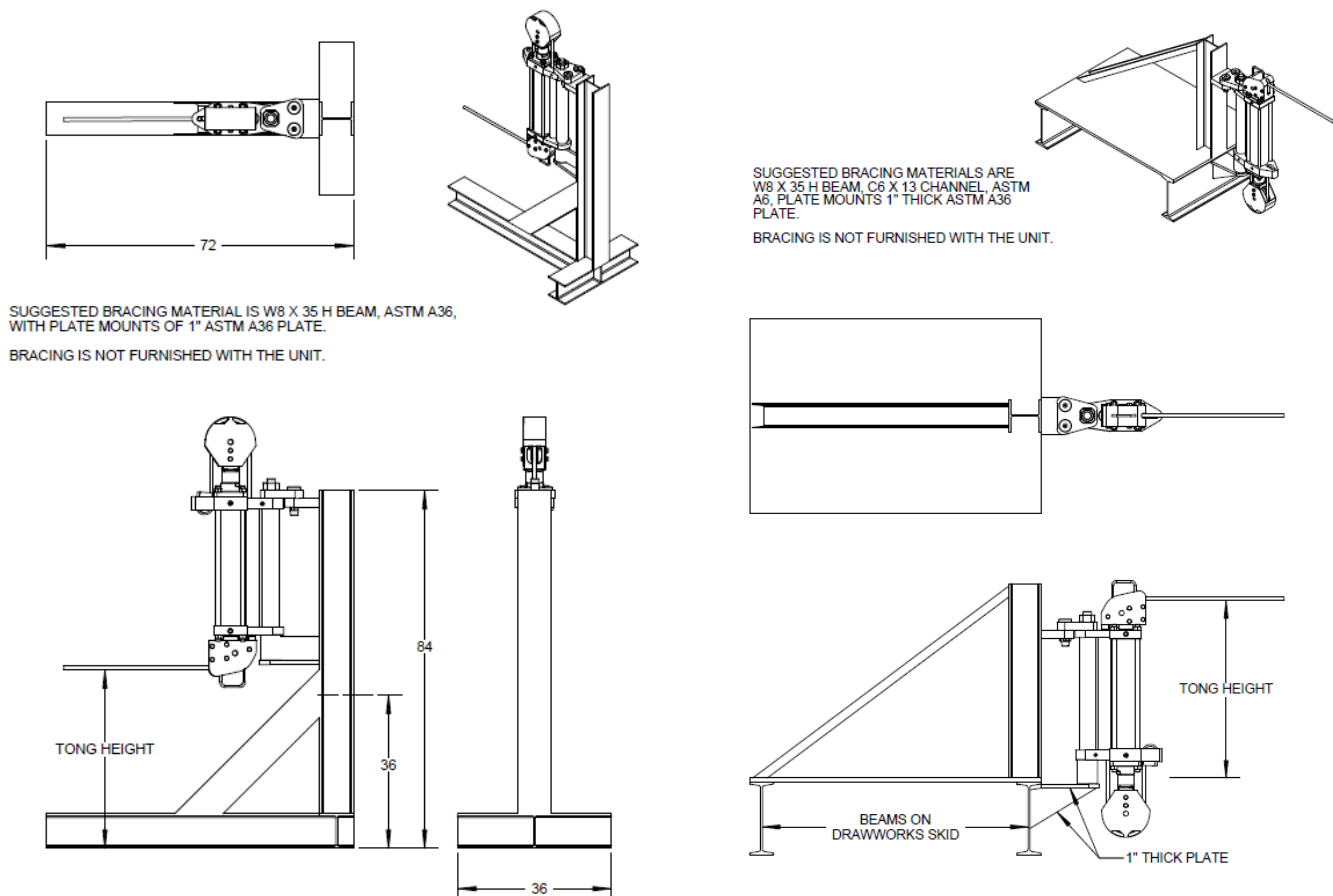


Figure 6; Typical installation

Slide the cylinder onto the backup post and install the top anchor plate and the two (2) pins (see Figure 7). Add the retaining nut and two (2) cotter keys. The retaining nut need not be super tight. Use a drop of Loctite ® or silicone sealer to keep it in place.



Figure 7

The hydraulic power unit requires three (3) phase 460 volts AC. The motor can be requested for 230/220 volts but 460 provides better performance. The hydraulic hoses to the cylinder can be lengthened to 50 feet without affecting cylinder operation, but the five (5) control hoses should remain at 25 feet as longer hoses will adversely affect cylinder reaction time. The top connections are for the control hoses, those on the side are for cylinder hoses. Electrical is connected through the top of the control box. The connections and control switch should be easy to reach. The fluid temperature gauge and filter condition

indicator is on the opposite side and



Figure 8; Power unit



Figure 9

will need to be seen and serviced. Mount the power unit (step #2) securely by either bolting or welding it to the rig floor. The unit requires ventilation and secure routing of the five (5) control hoses and two (2) cylinder hoses.

The control box should be mounted where 1) it's convenient to the driller and 2) the 25 foot control

hoses will reach. Connect A on the control box to the A on the hydraulic power unit, B to B, etc. See Figure 8.



Main breaker must be off and “locked out” until all wiring and wiring inspection is done. Wiring must be performed by a qualified, licensed electrician.

To connect power (step #2), remove the starter faceplate and install the power cord cable, attaching the three (3) leads to terminals L1, L2, and L3 as shown in Figure 9. Attach the ground wire to any grounded screw inside the starter enclosure.

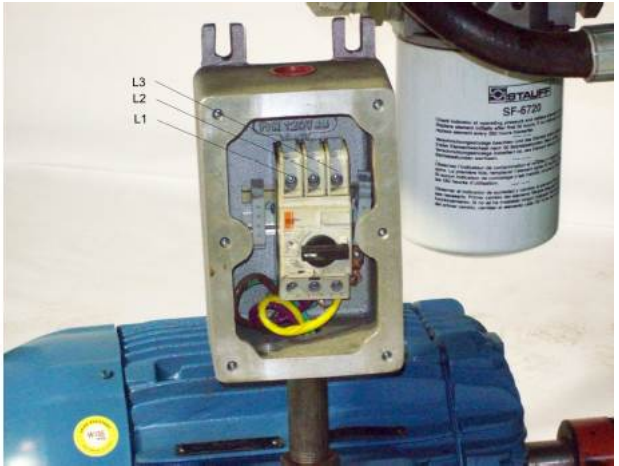


Figure 10



The green ground wire must ALWAYS be connected before power unit operation

Verify electrical connections and re-install starter faceplate. Remove lockouts and apply power. Verify counterclockwise pump rotation from the pump’s shaft end.

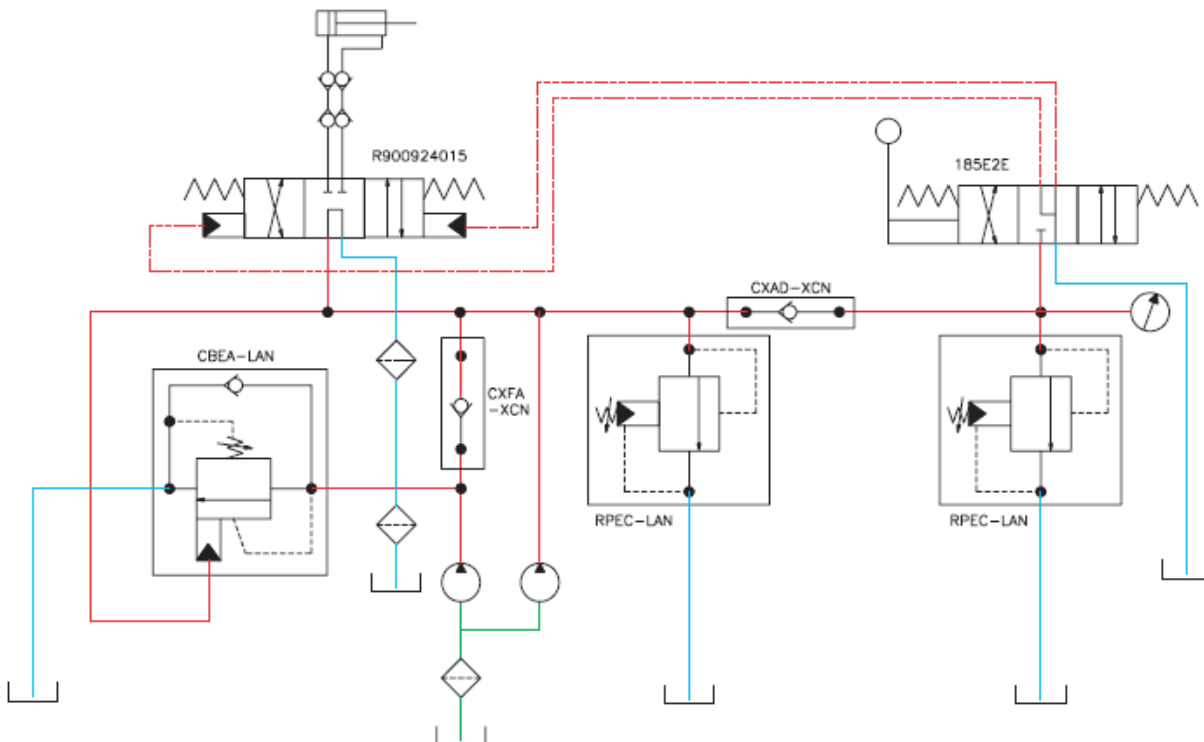


Figure 11: Hydraulic diagram

Install the wireline (step #3) as shown in Figure 12. 1) Attach the looped end of the wireline to the tongs. Slide a washer, the spring and then another washer onto the wireline and push them towards the loop end. Position the tong in the starting pull position (Figure 3).

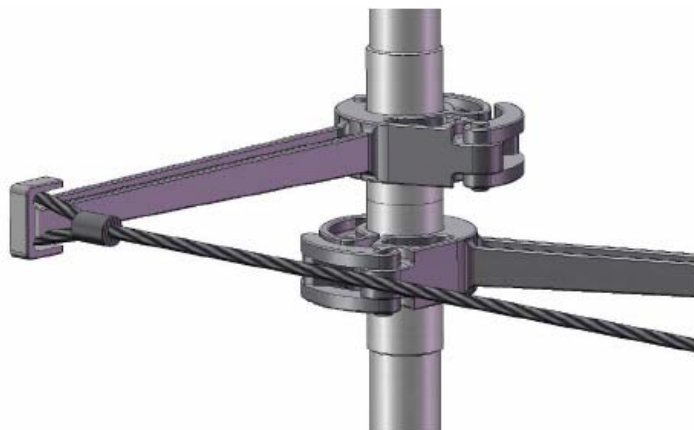


Figure 12

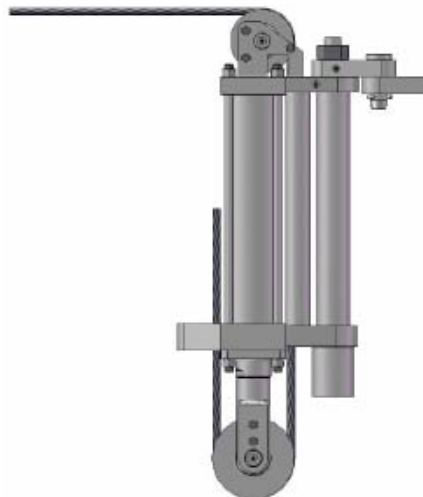


Figure 13



Be sure the cylinder is fully retracted

2) Remove both of the sheave guards. 3) Feed the line around the fixed end of the sheave (shown top in Figure 13), down through the wireline guide and around the rod end sheave and back up through the slot in the cylinder head. 4) Pull the line through to remove the slack. 5) Maintaining no slack in the line, form a loop as shown in Figure 13, feeding the slack end back through the cylinder head. 6) Place the wireline wedge in the loop and in the opening in the cylinder head (Figure 15) 7) Hold the tong in the

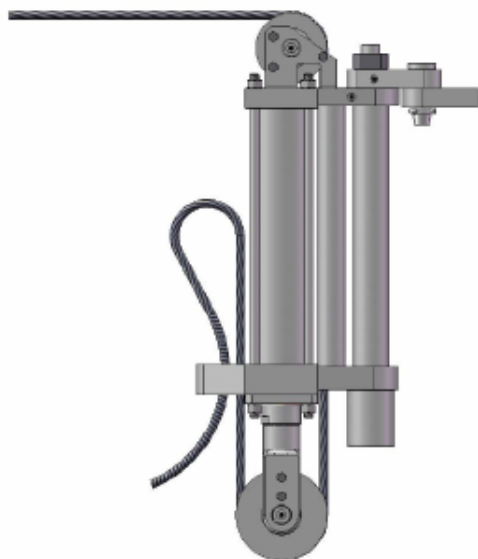


Figure 14

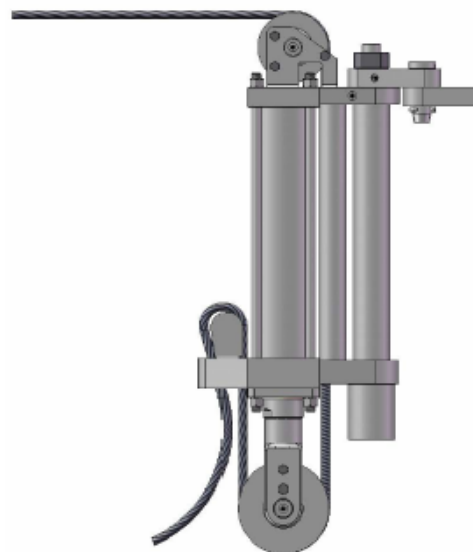


Figure 15; Wireline wedge inserted

start pull position and pull the dead end of the wireline as much as possible by hand, forcing the wedge further into the opening. 8) Replace the sheave guards. 9) Latch the tongs around the collars (or fasten the loop end of the line so it can't move) and activate the cylinder to pull the wedge tight into place. If the line length is less than eleven (11) feet, knock out the wedge and redo steps 6 through 8. 10) When the wireline is properly adjusted, excess cable can be cut off.



Figure 17: Push wireline spring



Figure 16

11) Push the wireline spring and washer up against the fixed sheave guard (Figure 17)  
12) Compress the spring six (6) inches towards the cylinder and tighten the wireline clamp (Figure 18)



Figure 18: Compress spring

# OPERATION

Once the hydraulic power unit is started, the operation of the cylinder is controlled by the control box. The lever is a spring return to center. Pushing the lever one direction will extend the cylinder (make up stroke) and pushing the lever in the opposite direction will retract the cylinder (reset).



Fully extend and retract the cylinder several times to purge air from the system

Set desired line pull using the calibration table (see Table 6) by determining the effective tong arm length (see Figure 3) and torque required for connections based on torque table (see Table 7). Figure the pressure setting for that torque (based on tong size). Extend and hold fully extended the cylinder with no load on the wireline. Turn the pressure adjusting knob until the pressure gauge reads the required pressure. Unit is now set.

## PREVENTIVE MAINTENANCE



This is a suggested PM schedule. The tool owner has the responsibility to adjust the program according to actual tool usage



For hydraulic units, disconnect lines and drain system's pressure before maintenance.

Normal wear in course of use will eventually reduce the cylinder's capability. Cracks or the appearance of damage on the wireline can indicate the need for repair, even impending failure, and requires prompt attention.

### Daily – While in use

- Apply EP 4 grease to prevent corrosion on wireline and grease fittings on cylinder
- Verify power unit and control box are in a secure and safe location
- Visually check wireline for broken wires, kinks, crushing, bird cages, corrosion, abrasion or any other abnormal condition – if found, replace
- Ensure wireline is routed so there no potential of 1) a pinching hazard and 2) anyone being trapped between the wireline and the rig structure

### Preventative Maintenance continued

- Inspect the cylinder mounting for cracked welds, bent or distorted mounting components, excessive corrosion, leaks, worn hoses or connections, etc – if found, repair/replace
- Verify power cables and hydraulic hoses are not a trip hazard and can't be pinched or cut
- Check for exposed wires and that electrical connections are secure
- Visually inspect the cylinder sheaves for excessive wear or abrasive material which damage the wireline
- Verify the sheaves rotate freely and sheave guards are in place and properly fastened to the cylinder
- Check cylinder for hydraulic fluid leaks – correct before operating
- Visually check cylinder rod (unpainted chromed surface) for damage (dings or burrs) that could damage the bearing or internal seals – if found, pull from operation and replace
- Keep the power unit exterior clean of oil, dust, dirt, water or chemicals
- Verify the hydraulic fluid level in the reservoir – fill as needed



Wireline is sharp. Wireline should not be checked by running a hand, gloved or not, over the surface.

### Quarterly

- Replace filter or earlier if the filter's indicator gauge shows a dirty element (before needle is in the red). Gauge and filter is shown in Figure 19.
- Change the hydraulic fluid every three (3) to six (6) months – see recommended fluid on Table 8. Clean diffuser and strainer by rinsing with solvent and drying. If cleaning is not effective, replace



Figure 19

# TROUBLESHOOTING

| Failure Mode                        | Possible Cause           | Possible Solution                          |
|-------------------------------------|--------------------------|--------------------------------------------|
| Motor will not run                  | Connections              | Verify wiring connections                  |
|                                     |                          | Check voltage (460)                        |
|                                     | Circuit breaker tripped  | Reset/Overload                             |
|                                     | Starter coil             | Check continuity                           |
| System pressure will not build up   | Motor                    | Replace                                    |
|                                     | Leak                     | Check hoses and fittings                   |
|                                     | Pump                     | Verify counterclockwise rotation           |
|                                     |                          | Check pump to motor coupling               |
| Cylinder speed slow                 | Relief valve             | Adjust or replace                          |
|                                     | Obstruction in flow line | Depressurize and drain. Check hoses        |
|                                     | Cylinder rod damaged     | Check for burrs, galls, or bent conditions |
| Cylinder will not extend or retract | Control hoses            | Verify connections                         |
|                                     | Obstruction in flow line | Depressurize and drain. Check hoses        |
|                                     | Pump worn out            | Replace                                    |

Table 9

## STORAGE AND TRANSPORTATION

- Prevent excessive exposure to water and moisture
- Clean the tool after use - steam clean as needed; remove mud, debris and any other substances
- For long term storage, depressurize the system and flush hydraulic fluid

# PARTS LIST

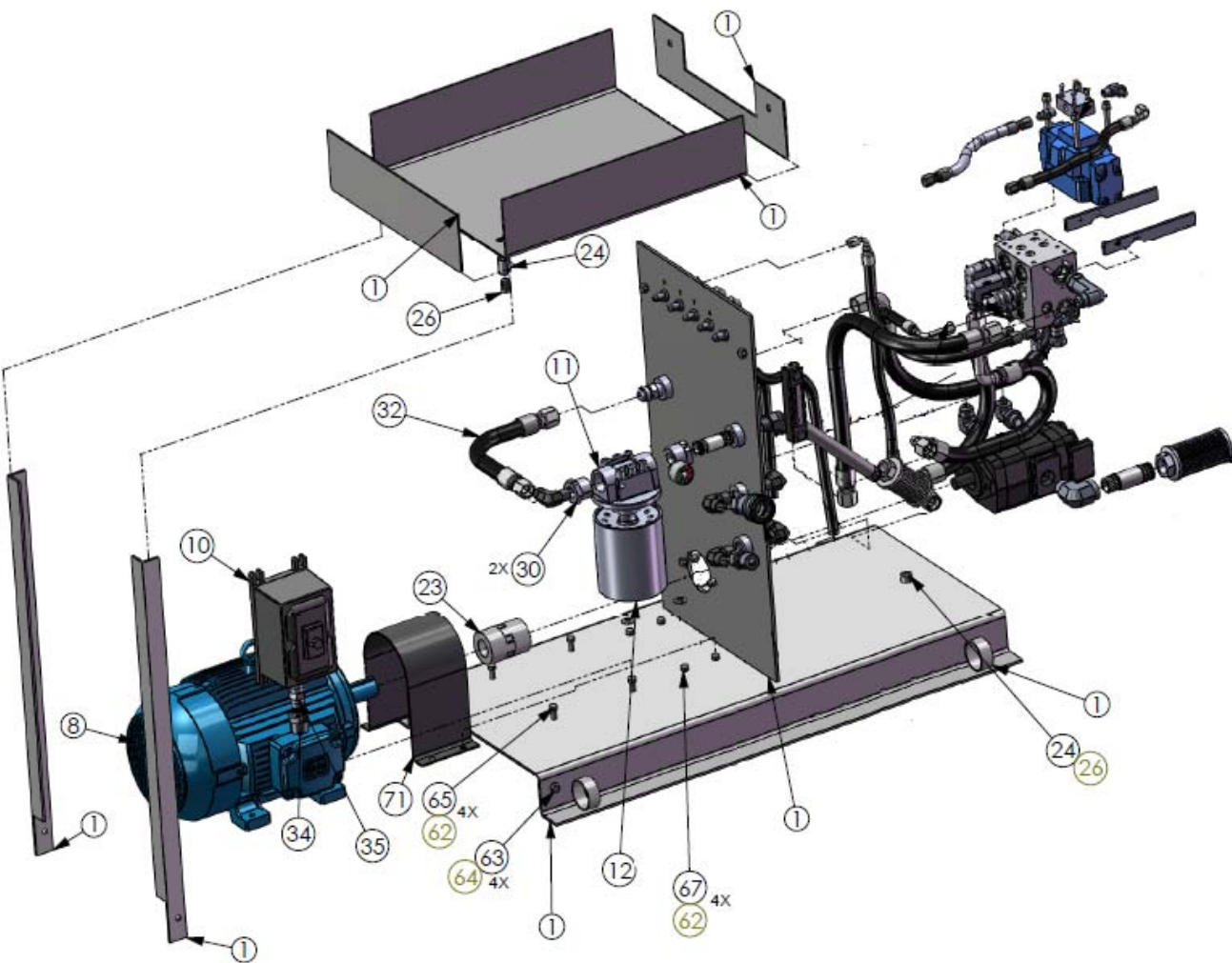


Figure 20

| #  | Component                             | Qty | P/N          |
|----|---------------------------------------|-----|--------------|
| 1  | EZ TORQUE POWER SUPPLY CHASSIS & TANK | 1   | T17567-01    |
| 8  | MOTOR                                 | 1   | T17567-05    |
| 10 | STARTER, POWER UNIT MOTOR             | 1   | T17567-09    |
| 11 | FILTER BASE                           | 1   | T37042-01    |
| 12 | FILTER                                | 1   | T37042-02    |
| 23 | COUPLING ASSEMBLY (MOTOR TO PUMP)     | 1   | T17567-40    |
| 24 | COUPLING                              | 2   | 030022       |
| 26 | PLUG                                  | 2   | 030000       |
| 30 | BUSHING, PIPE, HEX REDUCER            | 2   | 030010       |
| 32 | HOSE                                  | 1   | 050017       |
| 34 | BUSHING, PIPE, HEX REDUCER            | 1   | 030001       |
| 35 | HEX PIPE NIPPLE                       | 1   | T12460-36    |
| 62 | NUT, HEX                              | 8   | 040001       |
| 63 | NUT, HEX                              | 2   | 040004       |
| 64 | SCREW, CAP, HEX HEAD                  | 2   | 040003       |
| 65 | SCREW, CAP, HEX HEAD                  | 4   | 040000       |
| 67 | SCREW, CAP, HEX HEAD                  | 4   | 040050       |
| 71 | MOTOR SHAFT AND COUPLING GUARD        | 1   | T17567-01-13 |

Table 10 : Figure 20 BOM

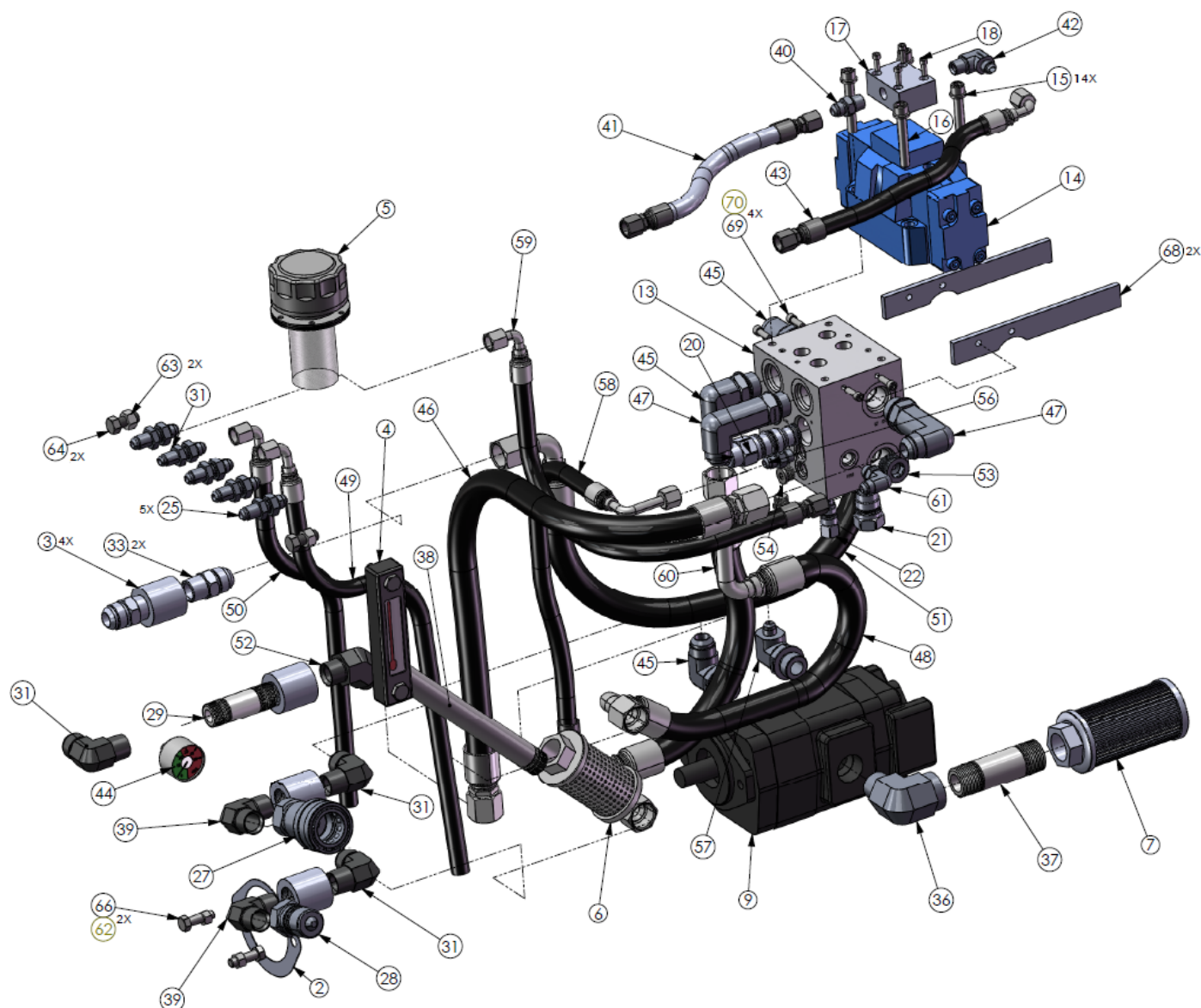


Figure 21

| #  | Component                  | Qty | P/N       |
|----|----------------------------|-----|-----------|
| 2  | PUMP GASKET                | 1   | T17567-29 |
| 3  | COUPLING, PIPE, STEEL      | 4   | 030021    |
| 4  | SIGHT LEVEL GAUGE/TEMP     | 2   | T17567-39 |
| 5  | FILLER CAP/FILLER BREATHER | 1   | 060000    |
| 6  | DIFFUSER                   | 1   | T17567-10 |
| 7  | STRAINER, SUCTION          | 1   | 060011    |
| 9  | TANDEM PUMP                | 1   | T17567-46 |
| 13 | MANIFOLD                   | 1   | 060001    |
| 14 | MAIN CONTROL VALVE         | 1   | T17567-16 |

Table 11: Figure 21 BOM

| #  | Component                  | Qty | P/N       |
|----|----------------------------|-----|-----------|
| 15 | WASHER, LOCK, SPLIT        | 14  | 040002    |
| 16 | SCREW, CAP, SOCKET HEAD    | 4   | 040008    |
| 17 | PILOT CONNECTION BLOCK     | 1   | 060005    |
| 18 | SCREW, CAP, SOCKET HEAD    | 4   | 040009    |
| 20 | COUNTERBALANCE VALVE       | 1   | 060002    |
| 21 | CHECK VALVE                | 1   | 060003    |
| 22 | CHECK VALVE                | 1   | 060004    |
| 25 | UNION, BULKHEAD            | 5   | 030013    |
| 27 | QUICK COUPLING (FEMALE)    | 1   | T12460-37 |
| 28 | QUICK COUPLING (MALE)      | 1   | T12460-40 |
| 29 | NIPPLE, PIPE               | 1   | 030009    |
| 31 | ELBOW                      | 3   | 030011    |
| 33 | CONNECTOR, STRAIGHT, STEEL | 2   | 030014    |
| 36 | ELBOW, STREET              | 1   | 030016    |
| 37 | NIPPLE, PIPE               | 1   | 030017    |
| 38 | NIPPLE, PIPE               | 1   | 030057    |
| 39 | ELBOW                      | 2   | 030012    |
| 40 | CONNECTOR                  | 1   | 030015    |
| 41 | HOSE                       | 1   | 050008    |
| 42 | ELBOW                      | 1   | 030024    |
| 43 | HOSE                       | 1   | 050007    |
| 44 | GAGE                       | 1   | 060006    |
| 45 | ELBOW                      | 3   | 030018    |
| 46 | HOSE                       | 1   | 050013    |
| 47 | ELBOW                      | 2   | 030005    |
| 48 | HOSE                       | 1   | 050015    |
| 49 | HOSE                       | 1   | 050009    |
| 50 | HOSE                       | 1   | 050010    |
| 51 | HOSE                       | 1   | 050014    |
| 52 | ELBOW                      | 1   | 030008    |
| 53 | PLUG                       | 1   | 030004    |
| 54 | PLUG                       | 1   | 030003    |
| 56 | CONNECTOR                  | 1   | 030019    |
| 57 | ELBOW                      | 1   | 030020    |
| 58 | HOSE                       | 1   | 050012    |
| 59 | HOSE                       | 1   | 050011    |
| 60 | CONNECTOR                  | 1   | 050016    |
| 61 | ELBOW                      | 1   | 030052    |

Table 11: Figure 21 BOM continued

| #  | Component                | Qty | P/N          |
|----|--------------------------|-----|--------------|
| 62 | NUT, HEX                 | 2   | 040001       |
| 63 | NUT, HEX                 | 2   | 040004       |
| 64 | SCREW, CAP, HEX HEAD     | 2   | 040003       |
| 66 | SCREW, CAP, HEX HEAD     | 2   | 040016       |
| 68 | MAIN VALVE BLOCK BRACKET | 2   | T17567-01-10 |
| 69 | SCREW, CAP, SOCKET HEAD  | 4   | 040006       |
| 70 | WASHER, LOCK             | 4   | 040007       |

Table 11: Figure 21 BOM continued

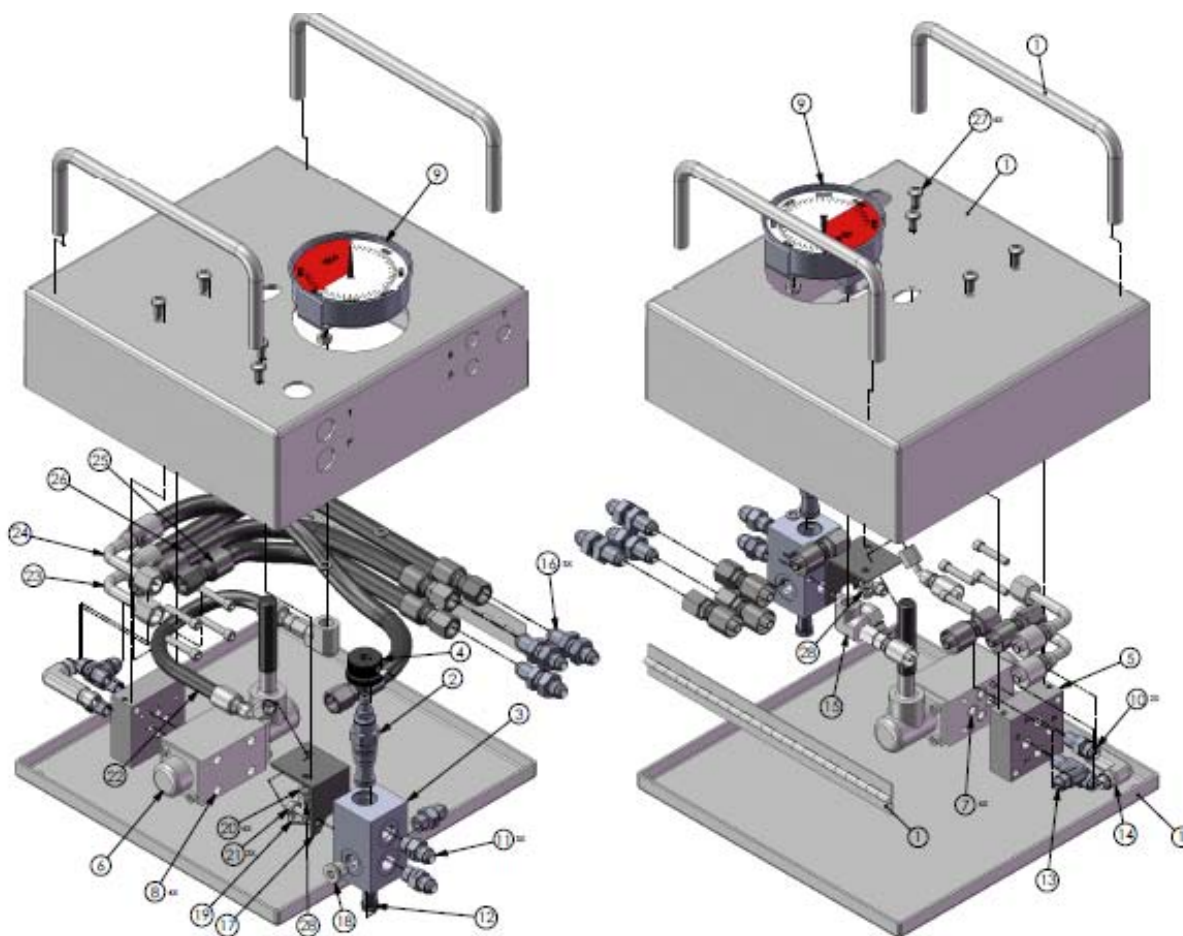


**Figure 22**

| #  | Component                     | Qty | P/N       |
|----|-------------------------------|-----|-----------|
| 1  | REMOTE CONTROL MODULE HOUSING | 1   | T17567-33 |
| 2  | RELIEF VALVE                  | 1   | 060041    |
| 3  | BODY, LINE MOUNT              | 1   | 060007    |
| 4  | RELIEF VALVE KNOB KIT         | 1   | 060008    |
| 5  | CONTROL VALVE SUBPLATE        | 1   | 060009    |
| 6  | CONTROL VALVE                 | 1   | 060010    |
| 7  | O-RING                        | 1   | 020001    |
| 8  | SCREW, CAP                    | 4   | 040010    |
| 9  | EZ TORQUE GAUGE 0-5000 PSI    | 1   | T17567-34 |
| 10 | CONNECTOR                     | 2   | 030015    |
| 11 | CONNECTOR, STRAIGHT           | 3   | 030019    |
| 12 | PLUG, PIPE                    | 1   | 030000    |
| 13 | ELBOW                         | 1   | 030024    |
| 14 | ELBOW                         | 1   | 030025    |
| 15 | ELBOW                         | 1   | 030026    |
| 16 | UNION, BULKHEAD               | 3   | 030013    |
| 17 | BRACKET, RELIEF VALVE         | 1   | T17567-48 |
| 18 | PLUG                          | 1   | 030003    |
| 19 | ELBOW                         | 1   | 030145    |
| 20 | WASHER, LOCK                  | 4   | 040007    |
| 21 | SCREW, CAP, SOCKET HEAD       | 2   | 040006    |
| 22 | HOSE                          | 1   | 050002    |
| 23 | HOSE                          | 1   | 050005    |
| 24 | HOSE                          | 1   | 050008    |
| 25 | HOSE                          | 1   | 050003    |
| 26 | HOSE                          | 1   | 050007    |
| 27 | SCREW, PAN HEAD               | 4   | 040103    |
| 28 | NUT, HEX                      | 2   | 040104    |

Table 12; Control box BOM

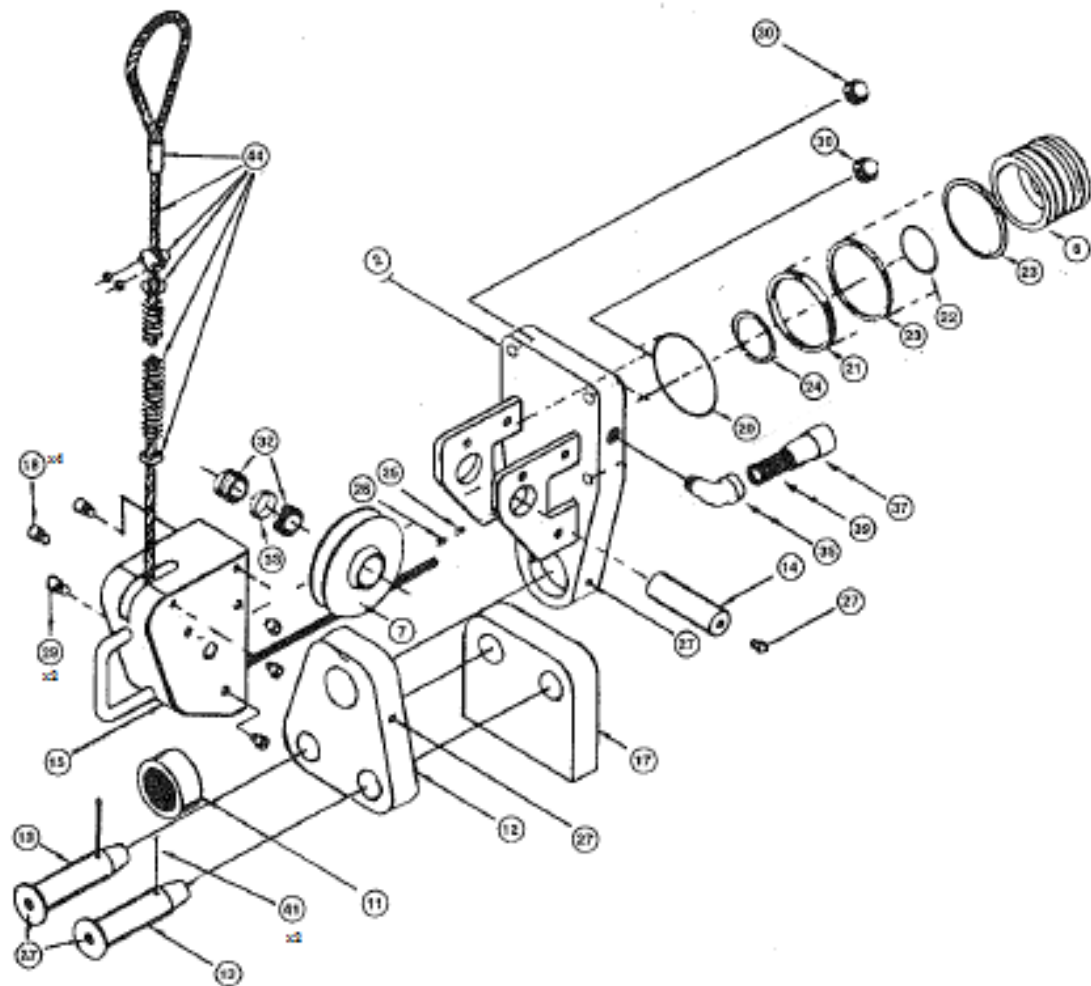


Figure 23

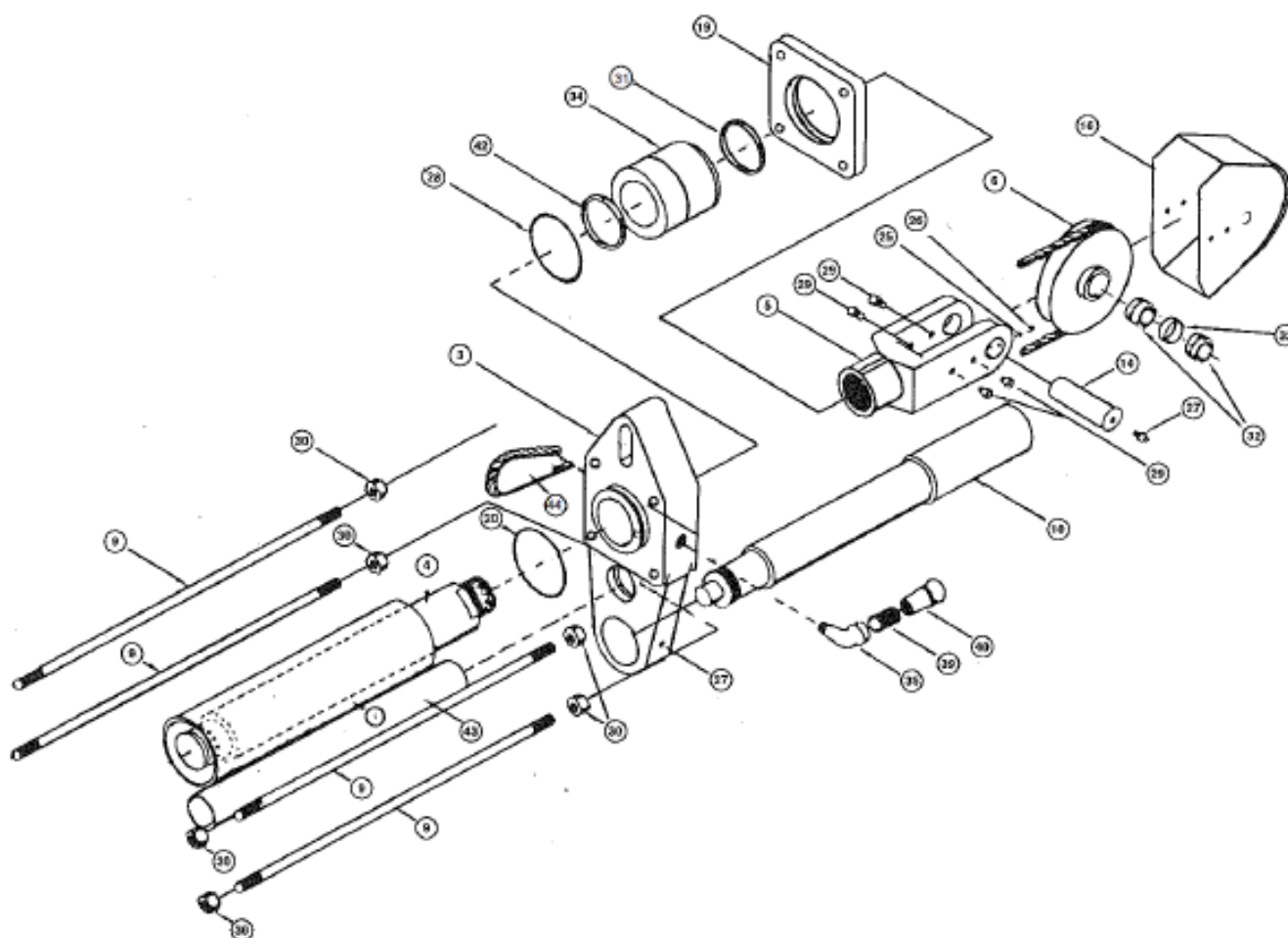


Figure 23 continued

| #  | Component                      | Qty | P/N       |
|----|--------------------------------|-----|-----------|
| 1  | Cylinder Tube                  | 1   | T22427    |
| 2  | Cylinder Head - Blind End      | 1   | T12460-02 |
| 3  | Cylinder Head - Rod End        | 1   | T17572    |
| 4  | Piston Rod                     | 1   | T22425    |
| 5  | Yoke Piston Rod                | 1   | T12460-05 |
| 6  | 8" Sheave                      | 1   | T12460-44 |
| 7  | 6" Sheave                      | 1   | T12460-45 |
| 8  | Piston                         | 1   | T17571    |
| 9  | Tie Rod Cylinder               | 4   | T22428    |
| 10 | Back-up Post                   | 1   | T22426    |
| 11 | Retaining Nut - Anchor Adapter | 1   | T12460-11 |
| 12 | Anchor Adapter                 | 1   | T12460-12 |
| 13 | Pin Anchor Adapter             | 2   | T12460-13 |
| 14 | Shaft - Sheave                 | 2   | T12460-51 |
| 15 | Guard - Fixed Sheave           | 1   | T12460-15 |

Table 13: Figure 23 &amp; 24 BOM

| #  | Component                  | Qty | P/N         |
|----|----------------------------|-----|-------------|
| 16 | Guard - Rod Sheave         | 1   | T12460-16   |
| 17 | Anchor Adapter             | 1   | T12460-17   |
| 18 | Cap Screws                 | 4   | 040021      |
| 19 | Retainer Plate             | 1   | T17569      |
| 20 | O Ring (w/Back up Ring)    | 2   | T12460-20   |
| 21 | Rider Ring (Piston)        | 1   | T17568-01   |
| 22 | Piston I.O. Seal (O-Ring)  | 1   | T17568-02   |
| 23 | Piston U Cup               | 2   | T12460-47   |
| 24 | Truarc Retainer Ring       | 1   | T12460-24   |
| 25 | Half Dog Headless Setscrew | 2   | 040033      |
| 26 | Headless Setscrew          | 2   | 040032      |
| 27 | Alemite Grease Fitting     | 7   | 080013      |
| 28 | Cartridge OD Seal          | 1   | T17568-03   |
| 29 | Cap Screws                 | 10  | 040175      |
| 30 | Nuts - Tie Rod             | 8   | T12460-30   |
| 31 | Backup Ring                | 2   | T17568-03-2 |
| 32 | Roller Bearing             | 4   | T12460-32   |
| 33 | Spacer                     | 2   | T12460-33   |
| 34 | Rod Bearing Cartridge      | 1   | T17570      |
| 35 | Street Elbow               | 2   | 030191      |
| 37 | Quick Coupling             | 1   | T12460-37   |
| 39 | All Thread Nipple          | 2   | 030096      |
| 40 | Quick Coupling, Male       | 1   | T12460-40   |
| 41 | Cotter Pin                 | 2   | 080020      |
| 42 | Rod Seal                   | 1   | T17568-04   |
| 43 | Wireline Guide             | 1   | T22492      |
| 44 | Wireline Assembly          | 1   | T22488      |
| 45 | Rod Wiper                  | 1   | T17568-05   |
| 47 | Ring, Cylinder Head Backup | 6   | T12460-20-2 |

Table 13: Figure 23 & 24 BOM continued

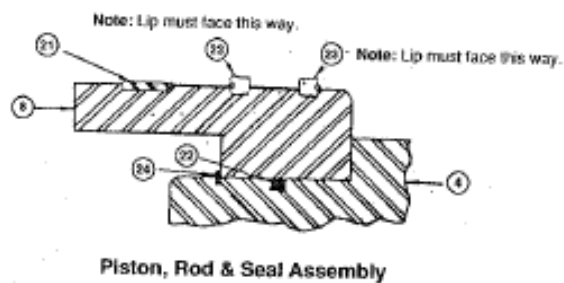


Figure 24

## SPARE PARTS LIST

Parts adequate for one (1) year of normal intended use if oil is kept clean. Replace the filter before filter indicator moves into the red zone. Drain and replace fluid whenever it is discolored, cloudy, dirty, or has overheated.

| Component                                        | Req | P/N       |
|--------------------------------------------------|-----|-----------|
| EZ Torque Cylinder Seal Kit (all cylinder seals) | 1   | T17568-07 |
| EZ Torque Power Unit / Control Box Spares Kit    | 1   | T17567-50 |
| Wireline                                         | 1   | T22488    |

Table 14

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